

## REMARKS

### I. Status of Claims

Claims 1 - 18, 27 - 32, and 34 - 37 are pending. Claims 19 - 26 and 33 have been cancelled. Favorable consideration of the remaining claims is respectfully requested in light of the following remarks.

### II. Claims 1, 3-8, 12-13, 15-17 and 27-32 are patentable under 35 U.S.C. §102(b) over the U.S. Patent No. 3592,623 to Shepherd.

In the Office Action dated January 25, 2008, the Examiner had rejected claims 1, 3-8, 12-13, 15-17 and 27-32 under 35 U.S.C. §103(a) over the newly cited Shepherd reference. Applicants submit that claims 1, 3-8, 12-13, 15-17 and 27-32 are patentable over the newly cited Shepherd reference.

The present invention is directed to a glass melting furnace where the exhaust is positioned at a downstream end of the furnace.

In particular, independent claim 1 specifically recites “...an exhaust disposed within the downstream end of the glass-melting furnace for exhausting combustion gases only from the downstream end of the glass-melting furnace...”.

Independent claim 12 recites “...the exhaust having a centerline that is positioned at least about 70 percent of the distance from the charge end wall of the glass-melting furnace...”.

Independent claim 15 recites “...an exhaust disposed within the glass-melting furnace at the downstream end of the glass-melting furnace for exhausting combustion gases in the glass-melting furnace only from the downstream end...”.

Independent claim 27 recites “...at least one exhaust at the downstream end of the glass-melting furnace for exhausting combustion gases only from the at least one exhaust...”.

Independent claim 29 recites “...one or more exhausts disposed only at the downstream end of the glass-melting furnace...”.

Independent claim 31 recites “...no exhaust disposed within the first half of the glass-melting furnace...”.

In contrast, the newly cited Shepherd furnace describes a glass melting furnace having exhaust gas ports 32 and 33 that are positioned at the *upstream* end only of the furnace, as clearly shown in Figures 1 and 2 therein. In particular, the Shepherd reference, at least at column 3, line 20 through column 4, line 10, is dedicated to explaining the importance of the position of the exhaust ports 32 and 33 at the “charge” or front end of the furnace.

There is no teaching or suggestion in the Shepherd reference of positioning an exhaust at a downstream end, near the fining end of the furnace.

With respect to the Examiner’s statement in the Office Action, at page 3, that “[E]xhaust is a plurality of exhaust stacks as shown in Fig. 1.”, the Applicants respectfully submit that there are no “plurality of exhaust stacks.” Applicants respectfully note that the Shepherd Fig. 1 contains a plurality of downstream orifices 37a-37d, from which molten glass is drawn.

It is submitted that the Shepherd *upstream exhaust* furnace cannot solve the problem found in glass-melting furnaces where the velocity of the exhaust gases causes an undesired entrainment of the combustion fumes (released from the decomposition of the glass-forming raw materials) with the gases. Rather, the present invention provides a novel solution for glass-melting furnaces by having gases exhausted only from the exhaust at the downstream end of the glass-melting furnace. The Shepherd reference was not aware of these problems facing the glass-melting industry and did not address, let alone purport to solve, this problem found in glass making furnaces.

A person having ordinary skill in the art would have no apparent reason to reconfigure the Shepherd elements, as proposed by the Examiner, in order to achieve the novel glass-melting furnace being claimed herein.

Therefore, the present invention provides the novel combination of: i) a glass-melting furnace having a melting end and a fining end through which molten glass freely flows in an unimpeded manner so as to be blended and discharged from the furnace; ii) an

exhaust disposed within a downstream fining end of the furnace; and, iii) the exhaust disposed for allowing exhaust gases to provide additional heat to the melting glass-forming material. It is submitted that the present inventive furnace is configured to allow at least some air-entrained glass-forming materials (carried in the exhaust gases) to settle back into the melting glass as exhaust gases travel from the upstream end to the downstream end.

Accordingly, for at least these reasons, Applicants submit that the claims are patentable under 35 U.S.C. §102(b).

### III. Claims 2, 10-11 and 18 are also patentable under 35 U.S.C. §103(a)

In the Office Action dated January 25, 2008, the Examiner had rejected claims 2, 10-11 and 18 under 35 U.S.C. §103(a) over the newly cited Shepherd reference, in view of the U.S. Patent No. 5,925,165 to Pflügl (hereinafter "Pflügl").

Claims 2, and 10-11 depend from independent claim 1, and claim 18 depends from independent claim 15. Thus, these dependent claims are allowable over Shepherd for at least the reasons set forth above.

At least another reason these claims are further patentably distinct over the Shepherd and the Pflügl references is that the Pflügl reference describes an *incinerator* for refuse where slag is melted and heavy metals are separated using three different chambers within the melt furnace. In the Pflügl reference, gases are exhausted out of all three chambers. (See, for example, in Fig. 1 in the Pflügl reference, arrow 15, arrow 26 and arrow 39). The Pflügl reference thus fails to address the need to prevent the "exhaust from being removed only at the downstream end of the furnace", which problem is solved by the present invention.

There is no reason to reconfigure the Shepherd *upstream exhaust* furnace with elements from the Pflügl *refuse incinerator* furnace in order to make the inventive *glass-melting* furnace. The present inventive glass melting furnace includes at least one exhaust that is positioned downstream in order to allow an increased residence time of exhaust gases in the furnace. In the present invention, the positioning of the downstream

exhaust provides a more efficient use of what had been "waste" heat in prior art glass-melting furnaces. Thus, in the present inventive glass-melting furnace, the exhaust is positioned to: i) allow exhaust gases to provide additional heat to the melting glass-forming material, and ii) allow at least some air-entrained glass-forming materials to settle back into the melting glass as exhaust gases travel from the upstream end to the downstream end.

Further, claims 7, 10-11 and 18 recite embodiments having at least two exhaust stacks which are positioned or located at the downstream end of the furnace. The Shepherd reference fails to disclose at least two exhaust *downstream* stacks. The Pflügl reference also fails to teach or disclose at least two exhaust stacks which are positioned at the downstream end of the furnace. Instead, the Shepherd and Pflügl references disclose exhaust ports positioned at the upstream end of a furnace.

In the absence of such teaching, the Examiner had failed to establish a prima facie case of obviousness. Accordingly, claims 7, 10-11 and 18 should be allowable over the Shepherd and Pflügl references in their own right.

Accordingly, for at least these reasons, claims 7, 10-11 and 18 should be allowable over the Shepherd and Pflügl references in their own right.

#### IV. Claims 9 and 14 are also patentable under 35 U.S.C. §103(a)

In the Office Action dated May 30, 2007, the Examiner had rejected claims 9 and 14 under 35 U.S.C. §103(a) over the newly cited Shepherd reference, in view of the U.S. Patent No. 6,519,973 to Hoke (hereinafter "Hoke").

Claims 9 and 14 depend from claims 1 and 15, respectively, and should be allowable over Shepherd for at least the reasons set forth above.

At least another reason these claims are further patentably distinct over the Shepherd and the Hoke references is that the Hoke reference fails to cure the deficiencies in the Shepherd reference. The Examiner had admitted that Shepherd does not disclose an exhaust that is located at a sidewall of the furnace. For this teaching, the Examiner relied on Hoke, asserting that Hoke discloses a glass melting furnace where exhausts are

located at sidewalls of the furnace. However, claim 14 recites two exhausts, wherein each exhaust is separated laterally from the sidewalls.

There is also no interrelated teaching between the Shepherd and Hoke references, nor is there any "apparent reason" to combine the elements of Hoke and Shepherd. The common-sense creative person skilled in the art would not look to the Shepherd and Hoke references to provide two downstream exhausts, each separated laterally from the sidewalls, as set forth in claim 14.

In the absence of such teaching or suggestion, claim 14 should be allowable over the Shepherd and Hoke references in its own right for at least the reasons set forth herein.

#### V. Claims 34-37 are also patentable under 35 U.S.C. §103(a)

In the Office Action dated May 30, 2007, the Examiner had rejected claims 34-37 under 35 U.S.C. §103(a) over the newly cited Shepherd reference, in view of the U.S. Pub. No. 2001/0039813 to Simpson (hereinafter "Simpson") or U.S. Patent No. 6,237,369, to LeBlanc (hereinafter "LeBlanc").

Claims 34-37 depend from claim 1 and should be allowable over Shepherd for at least the reasons set forth above. In particular, the claims 34-37 provide additional structurally unique features to the claimed invention. Claim 34 recites a fining zone within the glass-melting furnace and at least one downstream burner supplying heat to the fining zone. Claim 35 recites that the downstream burner is mounted in the roof. Claim 36 recites that at least one upstream burner is mounted at an angle of up to about 20 degrees to the vertical. Claim 37 recites that the downstream burner is mounted at an angle of up to about 20 degrees to the vertical.

At least another reason these claims are further patentably distinct is that the Simpson and LeBlanc references fail to cure the deficiencies in the Shepherd reference. The Examiner had admitted that Shepherd does not disclose a burner for supplying heat to the downstream fining end. For this teaching, the Examiner had relied on Simpson and/or LeBlanc, asserting that Simpson and/or LeBlanc disclose a glass melting furnace where a burner is installed in the roof.

There can be no interrelated teaching between the Shepherd, Simpson and LeBlanc references, nor is there any “apparent reason” to combine the Shepherd *upstream exhaust* elements with the Simpson and/or LeBlanc furnaces. The common-sense creative person skilled in the art would not look to use either the Simpson or LeBlanc reference to provide upstream and downstream burners in combination with an exhaust positioned at the downstream end of at least one burner. Neither the Simpson nor the LeBlanc reference teaches or suggests a furnace where the exhaust is in communication with the downstream end of the furnace so that combustion gases in the glass-melting furnace are exhausted only from the exhaust at the downstream end of the glass-melting furnace.

In the absence of such teaching or suggestion, claims 34 - 37 should be allowable over the Shepherd, Simpson and LeBlanc references in their own right for at least the reasons set forth herein.

#### VI. Conclusion

In view of the above amendments to the specification and claims and the remarks herein, it is submitted that the pending claims describe patentably distinct subject matter and that the application is in condition for allowance.

The invention, as defined in the pending claims, is neither disclosed nor suggested by the references of record. Accordingly, Applicants respectfully request allowance of all pending claims.

#### VII. Request for Telephone Interview

As a final matter, if the Examiner has any suggestions concerning different claim phraseology that, in the opinion of the Examiner, more accurately defines the present invention, prior to issuance of another Office Action, Applicants' attorney or agent requests the courtesy of a telephone interview at the Examiner's earliest convenience to discuss the application. Applicants' attorney or agent may be contacted at 740.321.7168.